CARCINOMA OF THE COLON—FROM A ROENTGEN STANDPOINT*

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DISCUSSION *by Kenneth S. Davis, Los Angeles; Robert R. Newell, M. D., San Francisco; Howard E. Ruggles, M. D., San Francisco.*

THE colon, including the rectum, is well known to be one of the commonest locations of malignancy. As the title states, we are only interested in the colon at this time. The comparative frequency of carcinoma in various segments of the colon is demonstrated by a small series of twenty-six pathologically proven cases collected over a period of five years at Highland Hospital in Oakland, California, in which there were three involving the cecum, two the ascending, four the transverse, four the descending, and thirteen the sigmoid. It is of interest that there have been seventy-four cases involving the rectum.

TECHNIQUE

In the consideration of carcinoma of the colon, the method of examination and technical procedures necessary are very important. They will only be briefly mentioned at this time.

The barium meal is of practically no value in the diagnosis of carcinoma of the colon, because of the irregular distribution of the meal throughout the lumen. The meal may be definitely contraindicated in that obstruction may be brought on by masses of barium becoming lodged at the level of a constricting lesion. Of course, in this instance, a barium meal, from the standpoint of diagnosis, would have definite value.

The barium enema is the most satisfactory of all examinations in the diagnosis of carcinoma of the colon, and the accuracy compares very favorably with the barium meal in the diagnosis of carcinoma of the stomach. Rankin, in his recent book on the colon and rectum, states:

"Roentgenoscopic examination of the large bowel, whereby visualization is assisted by palpatory manipulation, now permits accurate localization and recognition of the pathologic type in more than 95 per cent of lesions of the large bowel. This advance has been largely due to the work of Dr. Harry M. Weber."

In reviewing the records of Highland Hospital, I find also a very high percentage of accuracy in the x-ray examination of proven cases of carcinoma of the colon, done by Dr. William Sargent.

As to the technical procedures involved, the preparation of the patient is most important. I am in the habit of advising an enema of warm water the night before the examination, and another, one and one-half to two hours before coming to the office in the morning. I stress the necessity of the enemata, how much water I wish them to take and how. Sometimes if enemata are inconvenient, I advise a cathartic the day before, with the patient limiting himself to a non-residue diet.

The barium enema should always be done under fluoroscopic control, with palpation of the abdomen while the fluid is going in. By this means a mass is sometimes felt at the site of some slight hesitation in the flow of the barium, which might otherwise be taken for transient spasm. Rotation of the patient, and placing the patient on the abdomen is in many cases necessary in order that overlapped loops of the colon may be separated, permitting visualization of all parts of the colon. This is particularly true in the recto-sigmoid region. At this point I would stress the importance of examination of the recto-sigmoid region with the sigmoidoscope, since probably more lesions are missed at this location than anywhere else in the colon, due to the overlapping of the coils of the colon at this level which cannot, in some cases, be satisfactorily separated by rotation of the patient.

Films, with the colon filled, are a necessity in that they verify fluoroscopic findings; or if not, they warn the roentgenologist that it might be well to look again. They occasionally also demonstrate questionable lesions, which were not noted in the fluoroscopic examination, and which should then be rechecked fluoroscopically.

Films following evacuation I find of great value, particularly in differentiating a questionable narrow annular carcinoma from spasm. If there is sufficient emptying in a case of spasm, the folds of mucous membrane will usually present a normal arrangement.

The air insufflation of the colon following evacuation of a barium enema, which has been prepared using considerable acacia in order that sufficient barium will adhere to the mucous membrane so that it can be readily visualized, has a very definite place in the examination of the colon, but probably not as a routine procedure. I believe that it has its greatest value in the visualization of pedunculated tumors, and in the case where there is overlapping of loops of the colon which cannot be separated by rotating the patient.

DIAGNOSIS

Diagnosis depends on the demonstration of a constant filling defect which, with suitable technique, should be demonstrable both in the fluoroscope and on the films. This may not be in evidence at all times during the examination due to overlapping of the coils of the intestine, or because of too great or too little filling.

The palpation of a mass in the region of the defect is corroborative evidence, and should be sought for. Occasionally the palpation of an unsuspected mass calls the attention to a small filling defect that might otherwise be taken for spasm or overlooked.

The disturbance in the regular arrangement of the mucosal folds in the partially emptied colon may point to an early carcinoma, or verify a suspected one.

The disturbance in peristalsis due to infiltration of the wall and the increase in the motility are findings which are suggestive of carcinoma particularly in the cecum and ascending colon; but they are by no means definitely diagnostic since tuberculosis can give a similar picture.

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The insufflation of the colon following evacuation of a barium enema may be the means of demonstrating an early carcinoma, or of confirming a questionable one. However, except in polyposis, this examination usually only gives additional weight to evidence already brought out.

DIFFERENTIAL DIAGNOSIS

In the differential diagnosis, spasm must be considered in all parts of the colon. Occasionally there may be a localized area of contraction which could be due either to spasm or a narrow annular carcinoma. However, in spasm there is usually some change in the constricted area during the fluoroscopic examination, or in the various films made.

If the constriction is present during the entire examination without any palpable mass, reëxamination following sufficient belladonna to give a physiological effect should be done. At this time, if the constriction is due to spasm, it will in all probability have disappeared or changed its shape.

Benign tumors of the colon are usually smooth in outline, in contradistinction to the irregularity of malignant lesions, and do not infiltrate the wall.

In the cecum and ascending colon, in addition to the lesions which have already been mentioned, deformity due to encapsulated appendicial abscess, hyperplastic tuberculosis, lymphosarcoma and actinomycosis, have to be considered.

In encapsulated appendicial abscess, the deformity of the cecum is usually smooth, and there is a boggy rather than a hard mass, as is found in carcinoma. Occasionally the deforming is irregular and is undistinguishable from carcinoma, except for the doughiness of the mass.

Hyperplastic tuberculosis frequently presents a more extensive involvement than carcinoma; it is usually smoother in outline and the mass is slightly less resistant; it is more likely to produce obstruction; and the patients are usually somewhat younger.

Lymphosarcoma is extremely rare in the colon. Its commonest location is in the cecum. It grows rapidly, is not very tender, and is usually less hard than carcinoma on palpation. It is stated that there is a tendency for the cecum to dilate, probably due to disturbance of the local nerve supply. Due to the rarity of the condition in this region and the fact that the differential diagnosis is not entirely clear cut, a preoperative diagnosis is seldom made. One case came to operation at Highland Hospital in the last five years. No roentgen examination was made.

Actinomycosis is very uncommon and presents no characteristic roentgen picture. A finding in differentiation which is mentioned and might be of value is that actinomycosis usually infiltrates the anterior abdominal wall, while carcinoma is more likely to involve the posterior wall.

In the transverse colon spasm, which has already been mentioned, is the chief condition which must be differentiated.

In the descending colon and sigmoid, spasm and inflammatory conditions must be differentiated from carcinoma since it is in this part of the colon that the narrow annular carcinoma is most commonly found. The differential points between spasm and annular carcinoma have already been mentioned. In the differentiation of inflammatory lesions which are not uncommon in the sigmoid, particularly in women (since the sigmoid is closely related to the pelvic organs and as a result may be involved in pelvic inflammatory masses), the shape of the deformity is one of the most valuable differential points. The deformity in inflammatory lesions is usually longer, and the infiltration of the wall more uniform than in carcinoma. Also where the inflammatory lesion is secondary to diverticulitis there will be in all probability typical diverticula scattered along the colon in this region. The palpable mass in inflammatory lesions is usually definitely boggy rather than hard, as in carcinoma. In ulcerative colitis, where the process is localized to a few inches of the colon, carcinoma might have to be differentiated, however, as in other inflammatory processes involving the colon the extent of the involvement is usually greater and the thickening of the wall more uniform than in carcinoma.

CONCLUSION

I would like to stress the definite value of early roentgenologic examination of all patients with any questionable bowel disturbance, since records show that the average patient with carcinoma of the colon has had definite signs, symptoms, or both, many months before presenting himself for roentgen-ray examination. The records of Highland Hospital show an average of eight months between the beginning of symptoms and the diagnosis. This plea bears the weight of evidence mentioned before, that the accuracy of the diagnosis of carcinoma by x-ray is very high in competent hands.

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DISCUSSION

KENNETH S. DAVIS, M. D. (Saint Vincent's Hospital, Los Angeles.)—Doctor Bowen has given a very good presentation of what is known and practiced in the roentgenographic diagnosis of carcinoma of the colon.

As the author stated, one cannot lay too much stress on the advantages of the barium enema over the motor meal in ruling out organic lesions of the colon. The latter is only indicated in those cases where there is a complete obstruction to the barium enema, and one wishes to know the extent of the lesion. Only a moderate amount of the barium should be given by mouth where there is any indication of obstruction.

As to the preparation of the patient I find that cleansing enemas do not completely evacuate the cecal contents, and that catharsis is indicated in the majority of cases.

The author has stressed the value of roentgenograms immediately after evacuation of the barium enema. I have found it extremely valuable to take a film twenty-four hours after evacuation, particularly when I was suspicious of multiple diverticula, or an incomplete obstruction.

The diagnostic radiographic signs of cancer of the colon are: (1) the filling defect; (2) the palpable mass corresponding to the filling defect; and (3) the evidence of obstruction to the barium enema.

In the differential diagnosis between carcinoma and tuberculosis of the colon, the latter has such a predilection for the ileocecal region that a lesion in this

part, especially if associated with pulmonary tuberculosis, should make one suspicious of this disease. The chief roentgenographic characteristics of tuberculosis of the colon are (1) the marked spasm of the bowel and (2) the hypermotility of the barium through the area of involvement. The filling defect of a cancer is a constant one, whereas the filling defect of a tuberculosis is variable, depending on the degree of spasm at the time of the examination.

It is practically impossible to differentiate between a diverticulitis, with a large inflammatory mass, and a cancer, as the roentgenographic findings in the two conditions are almost identical. True, one may see diverticula present in other parts of the colon which should make one suspicious of an inflammatory rather than a malignant mass. We have had fourteen cases of this type at Saint Vincent's Hospital. Of this group, six had definite malignant changes and eight were purely inflammatory lesions. Whether the malignancy was a superimposed pathologic condition or was primary is a debatable question. However, from both the x-ray and surgical standpoint it should make no difference whether cancer is or is not present in the mass. The treatment is the same.

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ROBERT R. NEWELL, M.D. (Stanford University School of Medicine, San Francisco). — Doctor Bowen has brought out some very important points which need to be understood by all physicians, that they may make the best use of roentgen consultation. The possibility of overlooking a tumor in the rectum by barium enema, when it is easy to be diagnosed by digital or sigmoidoscopic examinations, will bear reiteration.

I disagree with Doctor Bowen in regard to preparation for barium enema. Inasmuch as the colon almost always retains a large amount of barium enema for some hours, I am skeptical of its ability to empty itself of a cleansing enema. I would rather have the colon quite empty instead of full of water which will dilute the diagnostic enema. My own preference is for castor oil, two ounces the afternoon before, and then nothing more to eat (or only orange juice). The advantage of castor oil over other cathartics is its quick and rather violent action, coupled with a prompt removal of the irritant. What portion of the oil is not evacuated is absorbed like any other fat and removed from the bowel (resynthesized in the lacteals to the bland neutral fat). There will be many cases, of course, that cannot be given a cathartic with safety. This is just one more reason why the radiologist should be given at least a telephonic consultation before going ahead with the examination.

The x-ray apparatus makers provide a metal enema tip which I consider cruel. A rectal catheter of soft rubber is much more comfortable and stays in ordinarily quite well. For those who cannot retain an enema it is possible to buy enema tips of soft rubber provided with an external rubber bag which can be inflated after insertion through the anus.

I wish to stress the fact that inflammatory lesions originating in the appendix, diverticulitis, and even the female pelvic organs, can imitate a neoplastic obstruction in the colon.

It is not infrequently impossible for the surgeon to tell whether he is dealing with an infectious or a neoplastic development, even after he has opened the abdomen.

Hyperplastic tuberculosis is also sometimes impossible to distinguish from carcinoma, though often the local hyperactivity of the bowel, associated with tuberculosis, may afford differentiation.

One intrinsic bowel obstruction not neoplastic must also be mentioned, namely, intussusception.

In conclusion, I would go even further than Doctor Bowen. I think we must hold ourselves ever ready to do painstaking examination of the colon on even slight symptoms, especially because of the good results of early removal of carcinoma of the colon.

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HOWARD E. RUGGLES, M. D. (Fitzhugh Building, San Francisco).—Doctor Bowen has well emphasized the importance of a thorough, detailed examination in the diagnosis of carcinoma of the colon. Here, as elsewhere in the gastro-intestinal tract, early lesions are easily overlooked. Repeated examinations will not infrequently mean the saving of a patient's life as well as a professional reputation.

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DOCTOR BOWEN (Closing).—Both Doctor Newell and Doctor Davis have spoken in favor of cathartics rather than enemata as preparation for a barium enema. There is no doubt that the method is very thorough; however, the results may be disastrous in a complete or nearly complete obstruction which has not been suspected by the roentgenologist. In doing a barium enema, following cleansing enemata, if there has not been a complete cleansing of the colon, it will be quite evident. At the same time any obstruction will present itself. If there is no evidence of obstruction, a cathartic can then be given safely and the barium enema repeated.

Doctor Davis has mentioned in the differential diagnosis of carcinoma and tuberculosis of the colon (1) the frequency of tuberculosis in the ileocecal region; (2) that tuberculosis in the colon is frequently associated with pulmonary tuberculosis; (3) that there is marked spasm of the bowel in the region of the lesion; (4) that there is marked hypermotility of the barium through the involved area; and (5) that the deformity of cancer is constant and that of tuberculosis is variable. It is true that the above five points apply to ulcerative tuberculosis of the colon; however, in hyperplastic tuberculosis, in my opinion, only number one applies. Hyperplastic tuberculosis of the cecum is very frequently present without evidence of pulmonary tuberculosis. Some authorities consider it a primary lesion. In the small number of cases of hyperplastic tuberculosis I have seen, the deformity has been constant; there has been no hypermotility and no pulmonary tuberculosis.

There is one point which I did not mention in the paper and that has not been discussed—the fact that in the large percentage of cases hyperplastic tuberculosis occurs before forty years of age, while carcinoma of the colon usually appears after forty.

ACTINOMYCOSIS OF THE KIDNEY*

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TEN THOUSAND autopsies have been performed during the last fifteen years (1918-1933) at the Los Angeles County General Hospital. Of this number, five were proved cases of actinomycosis; only one of the five showed actinomycotic involvement of the kidney. Recently Cummings and Nelson [1] collected thirty-seven reports of renal actinomycosis from the literature. They concluded that only eleven of these gave evidence of "primary" assault upon the kidney.

Those who have reported cases of renal actinomycosis have usually attempted to define whether the lesion was primary or secondary. Such a distinction is specious. According to our present knowledge, primary actinomycosis of the kidney is inconceivable, if we mean by "primary" that the lesion originated in the kidney. This use of

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